Chapters 1-3

Draft Recovery Plan for Idaho Snake River Spring/Summer Chinook and Steelhead Populations

in the

Snake River Spring/Summer Chinook Salmon Evolutionarily Significant Unit

and

Snake River Steelhead Distinct Population Segment

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Chapter 1 ▪ Introduction

This is a recovery plan (Plan) for the protection and restoration of Idaho's Snake River spring/summer Chinook salmon and summer steelhead populations. The fish populations belong to larger groups of Snake River salmon and steelhead that are currently listed under the Endangered Species Act (ESA). This Plan to recover the fish is the product of a collaborative process initiated by the NOAA's National Marine Fisheries Service (NMFS) in the state of Idaho and includes the involvement of other federal and state agencies, tribes, local governments, and the public.

NMFS is required, pursuant to Section 4(f) of the Endangered Species Act of 1973 (ESA), to develop recovery plans for species listed under the ESA. Recovery plans identify actions needed to restore threatened and endangered species to the point where they are again self-sustaining elements of their ecosystems and no longer need the protections of the ESA.

The Plan focuses on two species of salmon and steelhead that occupy habitats in the Idaho portion of the Snake River basin:

- The Snake River spring/summer Chinook salmon *(Oncorhynchus tshawytscha)* Evolutionarily Significant Unit (ESU) for federal ESA-listed salmon was listed as a threatened species on April 22, 1992 and the listing was reaffirmed on June 28, 2005.

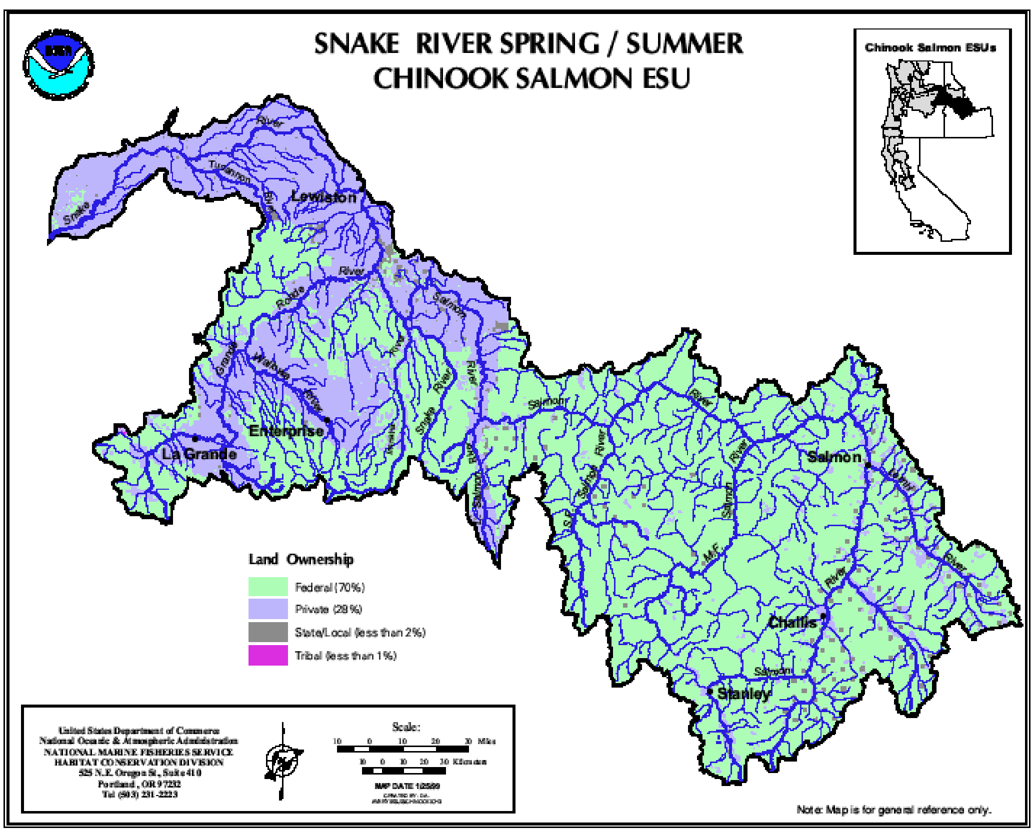

Figure 1-1. Snake River Spring/Summer Chinook Salmon Evolutionarily Significant Unit.

- The Snake River steelhead *(Oncorhynchus mykiss)* Distinct Population Segment (DPS) for federal ESA-listed steelhead was listed as threatened on August 18, 1997. This listing was reaffirmed on January 2, 2006.

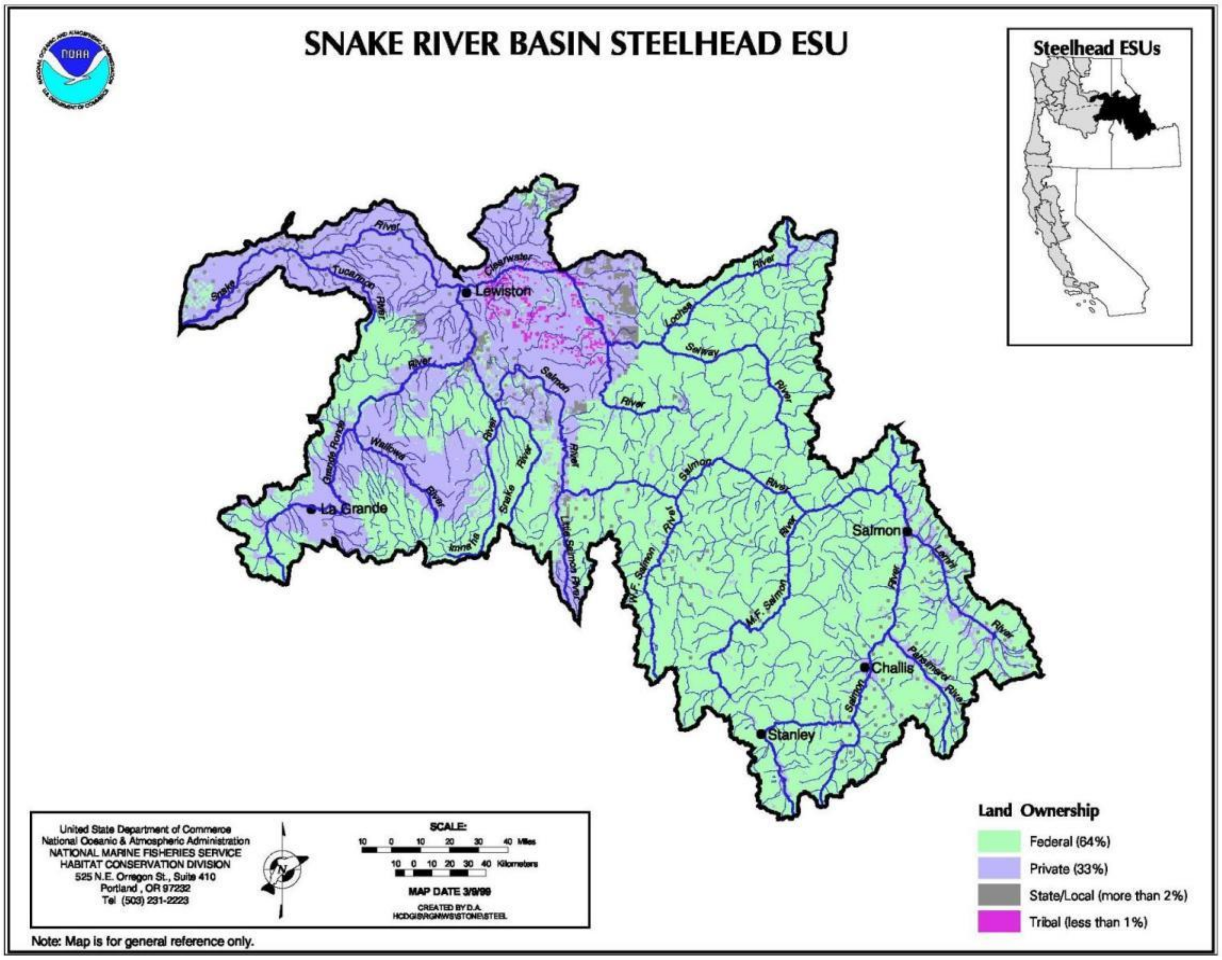

Figure 1-2. Snake River Steelhead Distinct Population Segment. [NMFS originally listed the species as an ESU. The agency revised its determination in 2006 and delineated the species as an anadromous, steelhead-only distinct population segment (DPS).]

Recovering these spring/summer Chinook and steelhead populations requires far-reaching actions that address the many factors that challenge their survival. The fish begin life in the gravel of freshwater streams of the Snake River basin, up to 900 miles inland from the Pacific Ocean and 6,500 feet above sea level. They travel downstream from their natal streams, through the Snake and Columbia Rivers to the ocean, undergoing extraordinary metabolic changes on their way to adapt to salt water. After spending one to several years traveling hundreds of miles in the ocean they retrace their journey up the Columbia and Snake Rivers, and return to their natal streams to spawn.

Once abundant and widespread, Idaho's Snake River spring/summer Chinook and steelhead populations have been reduced to a fraction of their former numbers and have lost major portions of their historic habitat. Many of the populations are now extinct. The decline of the Idaho populations has been attributed primarily to juvenile and adult mortality from passage through eight major Columbia and Snake River dams, widespread habitat degradation, overexploitation of mixed-stock fisheries, and the effects of hatcheries.

1.1 Purpose of Plan

This Plan serves as a roadmap to recover Idaho's Snake River spring/summer Chinook salmon (hereafter, also referred to as simply "spring/summer Chinook" in this Plan) and steelhead populations. It lays out where we need to go and how best to get there. It identifies the conditions that led to the listing of Snake River spring/summer Chinook and steelhead as threatened species, as well as to the designation of their critical habitat, under the ESA. It describes actions that will improve the species' environment and survival chances. The proposed recovery actions address the threats facing these species and introduce a process to enhance the long-term survival and recovery of these Snake River populations. It is the intent of this Plan to improve the viability of these species to the point that ESA protection is no longer required.

The recovery plan also provides a tool to organize, coordinate, and prioritize the many possible actions that will be needed on the part of federal, state, and tribal agencies, local watershed councils and districts, and private citizens to recover the species. Further, it lays out a framework for addressing uncertainties, evaluating our progress towards recovery, and making necessary course adjustments that will help target limited resources effectively. Although recovery plans are guidance, not regulatory documents, the ESA clearly envisions recovery plans as the central organizing tool for guiding each species' recovery process. Recovery of anadromous fish species with complex life cycles, such as the spring/summer Chinook and steelhead of the Snake River basin, cannot be accomplished by addressing a single threat or limiting factor. Rather, recovery of these species requires a comprehensive approach that also accounts for the needs of the region and its people.

1.2 ESA Requirements

Section 4(f) of the ESA requires NMFS to develop and implement recovery plans for species listed as endangered or threatened under the statute. Recovery plans identify actions needed to restore threatened and endangered species to the point where they are again self-sustaining elements of their ecosystems and no longer need the protections of the ESA.

Section 4(a)(1) of the ESA lists factors for reclassification and delisting that must be addressed in a recovery plan. These criteria include:

- The present or threatened destruction, modification, or curtailment of the species' habitat or range;
- Over utilization for commercial, recreational, scientific or educational purposes;
- Disease or predation;
- The inadequacy of existing regulatory mechanisms;
- Other natural or human-made factors affecting its continued existence.

ESA section 4(f)(1)(B) directs that recovery plans, to the extent practicable, incorporate:

1. a description of such site-specific management actions as may be necessary to achieve the plan's goal for the conservation and survival of the species;

2. objective, measurable criteria which, when met, would result in a determination, in accordance with the provisions of this chapter, that the species be removed from the list; and;
3. estimates of the time required and the cost to carry out those measures needed to achieve the plan's goal and to achieve intermediate steps toward that goal.

It is also important for recovery plans to provide the public and decision makers with a clear understanding of the goals and strategies needed to recover a listed species, and the science underlying those conclusions (NMFS Interim Recovery Planning Guidance, October 2004).

Once a species is deemed recovered and therefore removed from a 'listed status," section 4(g) of the ESA requires the monitoring of the species for a period of no less than five years to ensure that it retains its recovered status.

1.2.1 Species Recovery under the ESA

NMFS is the agency responsible for recovery planning for anadromous salmonids, and for the decision to list and delist marine species for which it has ESA authority. NMFS believes that local support of recovery plans is essential to their successful implementation and is committed to involving local citizens and groups in development of the plans. NMFS developed this Plan with the involvement of other federal and state agencies, tribes, local governments, and the public. The Plan fulfills the initial ESA recovery planning requirements for Snake River spring/summer Chinook and steelhead.

In this Plan, recovery is generally defined as the restoration of listed species such that they become viable components of their ecosystem. The Plan provides the necessary information that NMFS has determined will lead to recovery of listed species and their associated habitats. The Plan describes the current species status, the 'gap' that needs addressing to reach recovery, as well as ongoing or proposed actions designed to aid in the recovery of the species. The Plan also provides an estimated timeframe and costs for the overall effort, and a framework for making future decisions regarding plan implementation and refinement.

1.3 How NMFS Intends to Use the Plan

Recovery plans are guidance documents, not regulatory documents. No agency or entity is required by the ESA to implement the recovery strategy or recommendations of a recovery plan. However, the ESA clearly envisions recovery plans as the central organizing tool for guiding each species' recovery process. They should also guide federal agencies in fulfilling their obligations under section 7(a)(1) of the ESA, which calls on all federal agencies to "utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species." In addition to outlining proactive measures to achieve the species' recovery, plans provide context and a framework for implementation of other provisions of the ESA with respect to a particular species, such as section 7(a)(2) consultations on federal agency activities, development of habitat conservation plans under section 10, special rules for threatened species under section 4(d), or the creation of experimental populations in accordance with section 10(j).

Recovery plans are intended to help NMFS and other entities to do the following:

- Judge the significance of proposed actions relative to the importance of the affected habitat and ESU/DPS survival and recovery.
- Guide and expedite ESA section 7 consultations, habitat conservation plan approvals, and permitting applications for proposed actions consistent with recovery plans.
- Ensure an integrated approach to ESA section 7 consultations across all "H's," (habitat, hydro, harvest, hatcheries).
- Focus funding and other efforts on priority areas and subjects that must be addressed first to achieve recovery.
- Improve cost effectiveness by identifying priorities and implementing credible adaptive management frameworks.
- Articulate the reason(s) for a species' endangerment, as well as why the particular suite of recovery actions described is the most effective and efficient approach to achieving recovery for the species

Without a plan to organize, coordinate and prioritize the many possible recovery actions on the part of federal, state, and tribal agencies, local watershed councils, and private citizens, our efforts may be inefficient or even ineffective. Development and implementation of a recovery plan helps target limited resources effectively. Further, recovery plans make visible the programs and activities of all the agencies and parties working on salmon recovery. This includes programs directly managed and implemented by land management and water management agencies; grants by regulatory and natural resource agencies; and programs that rely on the voluntary participation of many other people, such as private landowners, watershed councils, and various non-governmental entities.

NMFS intends to use the recovery planning process to develop cooperative relationships that will lead to positive actions benefiting ESA-listed species. For example, if limiting factors involving agriculture are identified in a subbasin, a beneficial partnership would include NMFS, the Natural Resource Conservation Services, and the Idaho Soil Conservation Commission, which has the responsibility to develop and improve best management practices for agriculture on private lands. The intent is to work within the framework of existing efforts whenever possible and not create duplicative efforts that may conflict with state or local programs.

NMFS' scientists and policymakers believe the plan should be a dynamic document, able to incorporate new information as it becomes available. Therefore, we have largely focused on actions needed in the relative short term. The plan will be reviewed periodically; the relative success of these actions in protecting Pacific salmon will be assessed and adjustments made or additional actions added.

1.4 Plan Development

This recovery plan is the product of a collaborative process initiated by NMFS and strengthened through involvement and review by natural resource agency staff and other stakeholders. This collaborative effort reflects NMFS' belief that it is critically important to base ESA recovery plans on state, regional, tribal, local, and private conservation efforts already underway throughout the region.

Local support for recovery plans by those whose activities directly affect the listed species, and whose actions will be most affected by recovery measures, is essential.

1.4.1 Stakeholder and Public Involvement

NMFS developed this plan together with the state of Idaho. NMFS and the state of Idaho identified specific populations within each species on which to focus recovery actions, based on information provided by the Interior Columbia Basin Technical Recovery Team (ICTRT). In conjunction with Idaho, NMFS then drafted the sections of this plan that address spawning, rearing, and migration habitat in Idaho. Beginning in 2006, preliminary drafts of the habitat sections have been posted at http://www.idahosalmonrecovery.net in order to gather feedback from stakeholders. As new drafts are posted, NMFS sends email notifications to interested parties such as state agencies, non-governmental organizations, and Indian tribes, asking these groups for feedback. Initial stakeholder responses have been incorporated, and NMFS posted a revised draft of the habitat section of this plan to http://www.idahosalmonrecovery.net in December 2011. After receiving comments from stakeholders on the December 2011 draft, NMFS will make any further revisions to address stakeholder concerns about the habitat section of this plan. Finally, NMFS will add sections to this plan on the other “H’s” (hydro, hatcheries, harvest), to address all the factors challenging the survival of the Idaho populations during their life cycle.

1.4.2 Recovery Domains and Technical Recovery Teams

This Plan for Idaho’s Snake River spring/summer Chinook and steelhead populations is not only based on local and collaborative efforts, but is part of a larger endeavor, one that encompasses four states and multiple listed salmon and steelhead species. Eighteen of the 33 salmon and steelhead species in NMFS’ Northwest Region are listed as threatened or endangered.

For the purposes of recovery planning for these species, NMFS designated five geographic “recovery domains”: Interior Columbia (which is divided into three sub-domains: the Snake River, Middle Columbia, and Upper Columbia); Willamette-Lower Columbia; Puget Sound; Oregon Coast; and Southern Oregon/Northern California Coast (Figure 1-3).

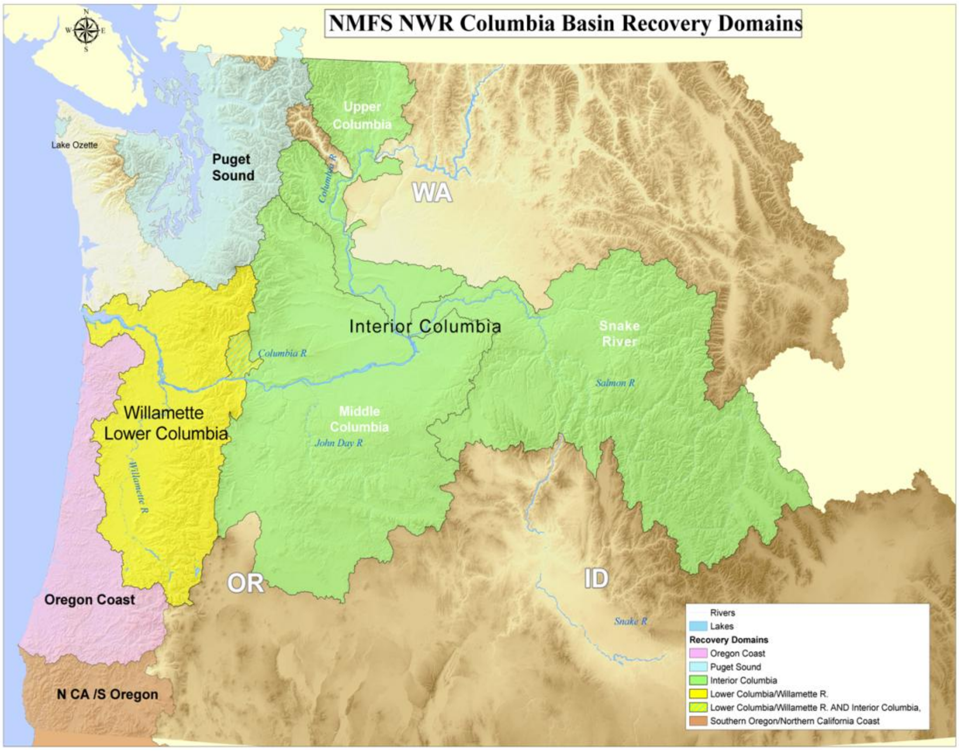

Figure 1-3. NMFS Northwest Region Salmon and Steelhead Recovery Domains.

The spawning and rearing range of Snake River salmon and steelhead in Idaho lies within the Interior Columbia domain's Snake River sub-domain. The Snake River recovery sub-domain contains three management units for Snake River spring/summer Chinook and steelhead (Figure 1-4).

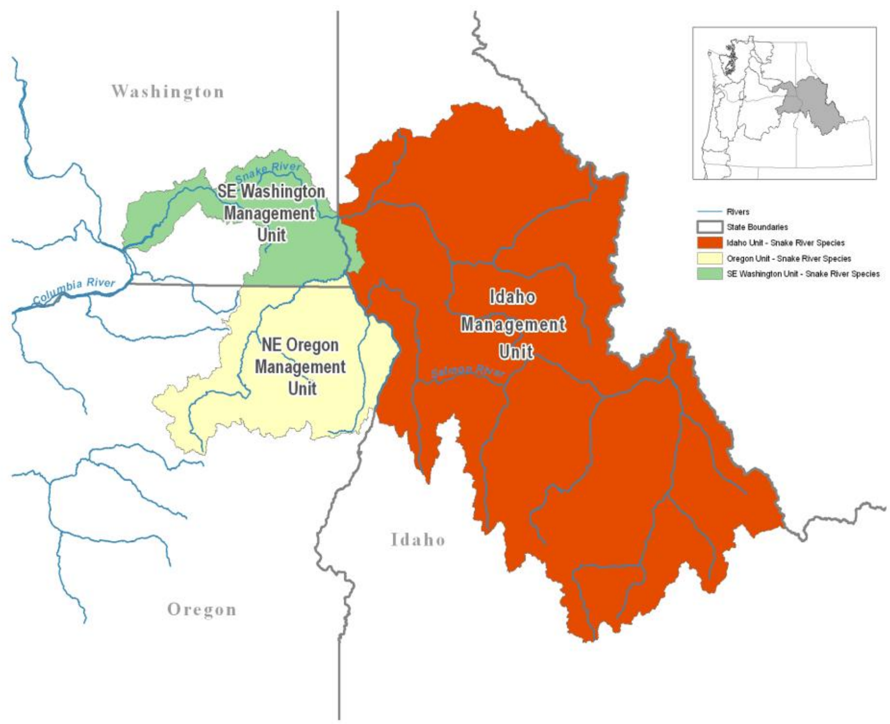

Figure 1-4. Snake River Basin Recovery Sub-Domain displaying the Idaho, Northeast Oregon, and Southeast Washington Management Units.

Snake River salmon and steelhead also occupy the management units in the states of Washington and Oregon, and similar plans define strategies for the recovery of these Snake River populations. The plan for the Southeast Washington Management Unit is available through the Snake River Salmon Recovery Board www.**snakeriverboard**.org. The recovery plan for the Northeast Oregon Management Unit is available at www.nwr.noaa.gov/Salmon-Recovery-Planning/ESA-Recovery-Plans/Draft-Plans.cfm.

The three recovery plans were developed through a coordinated effort to create a comprehensive basin-wide recovery plan for Snake River spring/summer Chinook, Snake River steelhead, Snake River fall Chinook, and Snake River sockeye. Species-level interdependencies, such as delisting criteria, population scenarios, out-of-subbasin effects, all-H life cycle analyses, and research, monitoring, and evaluation strategies, are addressed in the composite species-wide recovery plan, to which this Plan is an appendix.

Interior Columbia Technical Recovery Team

For each domain, NMFS appointed a team of scientists, nominated for their geographic and species expertise, to provide a solid scientific foundation for recovery plans. The charge of each Technical Recovery Team (TRT) was to define species structures, develop recommendations on biological viability criteria for each species and its component populations, provide scientific support to local and regional recovery efforts, and provide scientific evaluations of proposed recovery plans. The Interior Columbia Technical Recovery Team (ICTRT) included biologists from NMFS, states, tribal entities, and academic institutions.

All the TRTs used the same biological principles in developing their recommendations for species and population viability criteria. These criteria—which will be used, along with criteria based on mitigation of the factors for decline, to determine whether a species has recovered sufficiently to be down-listed or delisted— are discussed in Chapter 3. The principles are described in NMFS' technical memorandum, Viable Salmonid Populations and the Recovery of Evolutionarily Significant Units (McElhany et al. 2000). Viable salmonid populations (VSP) are defined in terms of four parameters: population abundance, productivity or growth rate, spatial structure, and diversity. A viable ESU or DPS (hereafter, referred to as species) is naturally self-sustaining, with a high probability of persistence over a 100-year time period. Each TRT made recommendations using the VSP framework. Their recommendations were also based on data availability, the unique biological characteristics of the species and habitats in the domain, and the members' collective experience and expertise. Although NMFS encouraged the TRTs to develop regionally specific approaches to evaluating viability and identifying factors limiting recovery, all the TRTs worked from a common scientific foundation.

1.5 Tribal Trust and Trust Responsibilities

In addition to its responsibilities to state and other federal agencies, NMFS has special responsibilities to northwest Indian tribes. Based on a complex history of treaties, executive orders, legislation, and court decisions, a number of Idaho, Oregon and Washington tribes share responsibilities and rights as co-managers of the fisheries in the Columbia Basin. These rights and expectations may not necessarily be met fully by achieving the basic purposes of the ESA and delisting of the species, although it will lead to major improvements in the current situation.

Historically, Snake River spring/summer Chinook and steelhead ranged throughout the Snake River basin including portions of Idaho, eastern Oregon, and eastern Washington. The fish were important to Native Americans of the Interior west. There are 15 federally recognized Indian tribes within the Columbia Basin, and all tribes have expressed strong interest in the protection and restoration of salmon and the health of the ecosystem upon which salmon depend. Two tribes are particularly important partners in recovering salmon and steelhead in Idaho: the Nez Perce Tribe and the Shoshone-Bannock Tribes. These tribes have strong fisheries programs through which they have implemented habitat restoration projects and hatchery supplementation for salmon and steelhead in the Snake River Basin. The Shoshone Piaute and Burns Piaute Tribes have also expressed interest in Salmon and Steelhead recovery.

Native Americans throughout the Pacific Northwest maintain strong cultural values for steelhead and salmon species. In the Treaties of 1855 between the United States and the Nez Perce Tribe, the Confederated Tribes of the Warm Springs Reservation of Oregon, the Confederated Tribes and Bands of the Yakama Indian Nation, and the Confederated Tribes of the Umatilla Indian Reservation, the tribes, in exchange for the preponderance of their lands, reserved the rights to fish within their reservations and "at all other usual and accustomed places." The usual and accustomed places are understood to include the millions of acres of aboriginal land ceded to the United States in the 1855 treaties, which extends to the Upper Columbia and Snake River basins. The Fort Bridger Treaty of 1868 between the United States and the Shoshone-Bannock Tribes, whose historical territory included much of the present-day states of Wyoming, Utah, Nevada, and Idaho, provided that these tribes "shall have the right to hunt on the unoccupied lands of the United States so long as game may be found thereon" (*hunt* has since been interpreted to include fishing). All of these tribes have fishing rights for salmon and steelhead and are co-managers of the fisheries.

Ensuring a sufficient abundance of salmon and steelhead to sustain harvest can be an important element in fulfilling treaty rights. NMFS is committed to meeting federal treaty and trust obligations to the tribes. These obligations are described in a July 21, 1998 letter from Terry D. Garcia, Assistant Secretary for Oceans and Atmosphere, U.S. Department of Commerce, to Mr. Ted Strong, Executive Director of the Columbia River Inter-Tribal Fish Commission. This letter states that recovery "…must achieve two goals; 1) the recovery and delisting of salmonids listed under the provisions of the ESA; and 2) the restoration of salmonid populations over time, to a level to provide a sustainable harvest sufficient to allow for the meaningful exercise of tribal fishing rights." Thus, it is appropriate for recovery plans to take these conditions into account and plan for a recovery strategy that includes harvest.

The ESA and tribal trust responsibilities complement one another. Both depend on a steady upward trend toward recovery and ESA delisting in the near term, while making river, harvest, and land management improvements for the long term. Furthermore, ESA delisting cannot occur until both biological objectives and the listing factors are considered and NMFS determines, based on an evaluation of the listing factors, that the species is no longer likely to require the protection of the ESA. Therefore, NMFS will make no delisting decision until it is clear that the threats to the species have been abated, and that the status and trends of both the fish and their habitats will be healthy and sustainable in the long term.

1.6 Building on Existing Efforts

A variety of forums already exists in the habitat, hydropower, harvest and hatchery sectors. These forums have been working to develop actions and programs that can contribute to recovery. It is important to recognize and make use of these forums, most of which have their own unique mandates and authorities. For example, in the habitat sector, key forums include regional recovery boards and watershed councils, whose constituents have substantial opportunity and authorities pertaining to habitat. In the harvest sector, the parties to U.S. v. Oregon and the Pacific Salmon Treaty have authorities to allocate fisheries' impacts within harvest rates set by NMFS. In the hatchery sector, the states, tribes and federal agencies have numerous programs designed to enhance fisheries and to promote conservation of listed species. These, too, are regulated by NMFS under the ESA. In the hydropower sector, there has been an extensive regional effort to increase survival of fish as they pass through the hydrosystem. Improvements have focused on the operation and the configuration of the Federal Columbia River Power System (FCRPS). It is very important that recovery plans integrate the work of these forums. Institutional frameworks for implementing recovery need to foster relationships between these forums.

Actions in this recovery plan will be based in part on subbasin assessments and subbasin plans developed for individual watersheds in the Columbia basin by local watershed councils and planning groups under direction of the Northwest Power and Conservation Council (NPCC). Subbasin plans developed through the NPCC process are incorporated into this Plan to address the needs required to restore Idaho Snake River spring/summer Chinook and steelhead. All three states in the Snake River basin maintain model watershed and watershed focus programs to coordinate watershed restoration activities. The Upper Salmon Basin Watershed Project and the Clearwater Focus Program operate in Idaho. Products produced by these groups were used in developing recovery plans for the Snake River salmon ESUs and steelhead DPS.

1.6.1 Idaho Partners in Recovery

Snake River salmon and steelhead face many threats in multiple environments throughout their life cycle. Everyone who lives, works, or plays on land or water in the Northwest can have positive and negative impacts on these fish. In short, virtually all human activities have some kind of impact on salmon, either directly or indirectly on their habitat. No single agency or action can accomplish the recovery of these endangered or threatened species.

NMFS intends to use the recovery planning process to develop cooperative relationships that will lead to positive actions benefiting ESA-listed species. For example, if limiting factors involving agriculture are identified in a subbasin, a beneficial partnership would include NMFS, the Natural Resources Conservation Service, and the Idaho Soil Conservation Commission, which has the responsibility to develop and improve best management practices for agriculture on private lands. Our intent is to work within the framework of existing efforts whenever possible and not create duplicative efforts that may conflict with state or local programs.

Many state and federal agencies manage, regulate, or contribute to the protection of natural resources in Idaho. These agencies are all potential partners with NMFS in some capacity in recovering listed salmon and steelhead. Public groups, such as watershed councils, agricultural groups, and environmental organizations, and private landowners also play an important role in recovering salmon and steelhead runs. The groups identified in Table 1-1 have a history of implementing projects to restore salmonid habitat in Idaho.

Table 1-1. State and Federal Agencies and Public Organizations Involved in Projects to Restore Salmonid Habitat in Idaho.

Entity	Roles and Responsibilities
State Agencies	
Idaho Dept. of Agriculture	Regulates confined animal feeding operations and pesticides within state of Idaho.
Idaho Dept. of Environmental Quality	Protects human health and the quality of Idaho's air, land, and water. The department has primary responsibility for the Clean Water Act in Idaho and develops water quality standards and “total maximum daily loads” (TMDLs) to attain the standards.
Idaho Dept. of Fish and Game	Protects and manages fish and wildlife in Idaho.
Idaho Dept. of Lands	Regulates forestry and mining in the State of Idaho, manages state timber endowments lands, and is a key partner with the federal government in developing the proposed Idaho Forestry Program, a component of the Snake River Basin Adjudication (SRBA).
Idaho Dept. of Transportation	Develops best management practices for road construction and maintenance in Idaho.
Idaho Dept. of Water Resources	Manages water rights and is a partner with federal agencies in settling the contentious Snake River Basin Adjudication (SRBA) and providing mechanisms for increasing instream flows for listed fish.
Idaho Governor’s Office of Species Conservation	Coordinates programs related to the conservation of threatened and endangered species in Idaho and provides funding to local groups implementing recovery plans.
Idaho Soil and Water Conservation Commission	Develops best management practices for irrigated agriculture and grazing and provides support and services to local conservation districts and landowners.
County Soil and Water Conservation Districts	Cover all of Idaho and have long been active in implementing conservation programs in the state. They have a long and successful history of pursuing funding and implementing on-the-ground practices with private partners.
Federal Agencies	
Bonneville Power Administration	Provides power to the Pacific Northwest and mitigates the impacts of the Federal Columbia River Power System on fish and wildlife.
Bureau of Land Management	Manages nearly 12 million acres of public lands in Idaho. Resources on the public lands include recreation, rangelands, timber, minerals, water, fish and wildlife, wilderness, air and soils, and scenic, scientific, and cultural values.
Bureau of Reclamation	Manages water in the western United States with dams, power plants, and canals. With the US Army Corps of Engineers, the Bureau of Reclamation owns and operates the Federal Columbia River Power System, a series of hydropower projects on the Columbia and lower Snake Rivers in the migration corridor for Idaho’s salmon and steelhead.
Environmental Protection Agency	Protects human health and the environment through regulations, enforcement, grants, research, and education. The Environmental Protection Agency (EPA) reviews state water quality standards developed by Idaho Department of Environmental Quality in accordance with the Clean Water Act. Under the Comprehensive Environmental Response, Compensation, and Liability Act (otherwise known as CERCLA or Superfund) the EPA enforces clean up of uncontrolled or abandoned hazardous-waste sites, such as former mine sites.
Federal Highway Administration	Administers federal funding for maintenance and construction of roads and highways.
Natural Resources Conservation Service	Works with individual farmers and ranchers, landowners, and local conservation districts through conservation planning and assistance programs to maintain productive lands and healthy ecosystems. Assistance programs help landowners reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters.
U.S. Army Corps of Engineers	Provides public engineering services and regulates alteration of streams and wetlands. With the Bureau of Reclamation, the U.S. Army Corps of Engineers owns and operates the Federal Columbia River Power System, a series of hydropower projects on the Columbia and lower Snake Rivers in the migration corridor for Idaho’s salmon and steelhead.
U.S. Fish and Wildlife Service	Conserves fish and wildlife and has ESA responsibilities for threatened bull trout, which occupy many of the same streams in Idaho as salmon and steelhead. They also operate salmon and steelhead hatcheries for supplementation programs in Idaho.

Entity	Roles and Responsibilities
U.S. Forest Service	Manages 20 million acres of public forests and grasslands in Idaho for sustainable multiple uses. National Forests in Idaho with salmon and steelhead habitat include the Boise, Clearwater, Nez Perce, Payette, Salmon-Challis, and Sawtooth National Forests.
Interested public—organizations and individuals	
Lemhi Regional Land Trust	Protects working ranchland and river corridors in central Idaho through conservation easements.
Palouse-Clearwater Environmental Institute	Through its Watershed Program, implements riparian and wetland restoration, watershed planning, water quality protection, and biological monitoring in the Palouse-Clearwater region.
Salmon Valley Stewardship	Works on community-supported policies and programs to protect natural resources, encourage sustainable practices for natural resource-based businesses, and promote responsible growth in the Salmon River valley.
The Nature Conservancy	Protects salmon habitat and working farms and ranches through conservation easements, land acquisitions, and water conservation agreements in its Salmon River focus area.
Trout Unlimited	Implements habitat restorations projects, such as large woody debris placement and riparian revegetation, in salmonid streams throughout the state, with the participation of local members.
Upper Salmon Basin Watershed Program	A community-driven partnership in which landowners voluntarily work with local, state, and federal partners to improve stream habitat for salmon and resident fish in the Upper Salmon River Basin. The Upper Salmon Basin Watershed Program (USBWP) staff, affiliated with the Idaho Governor's Office of Species Conservation, helps landowners develop restoration projects, seeks funding, assists with the permitting process, oversees the work, and monitors outcomes. Primary funding for the USBWP is provided by the Bonneville Power Administration.

1.7 Funding, Research, Monitoring, and Evaluation

NMFS intends for this recovery plan to provide the basis for federal and nonfederal funding entities to develop a coordinated and prioritized funding strategy. To facilitate implementation, NMFS intends to provide streamlined regulatory assurances for actions that are undertaken to implement recovery.

Research, monitoring, and evaluation are of the utmost importance in guiding actions and providing information on the effectiveness of actions so that adjustments can be made. Federal, state, and local entities monitor actions for specific and limited purposes, and this information may be of little or no value to other parties. All of these organizations are currently working on ways to increase the effectiveness and efficiency of monitoring and assure that the data collected is valuable to all parties.

The challenges of salmon recovery are immense, particularly in the face of increasing human populations and heavy demand for precious resources, such as sufficient clean water. Recovery efforts will be most effective if we are able to monitor the benefits and costs of our actions, proactively address the hard issues, and adjust our actions as we learn from experience (adaptive management).

Chapter 2 ▪ Biological Background

Chapter 2 describes the geographic setting of this Plan and the predominant uses of land in the region. This provides a contextual understanding of the current issues facing recovery efforts for Idaho populations of Snake River spring/summer Chinook and steelhead. The chapter also describes the structure of the ESU and DPS, discusses the listing of the populations, and provides short descriptions of population life history characteristics and critical habitat.

2.1 Geographic Setting

The Snake River basin encompasses an area of 107,000 square miles in the states of Idaho, Nevada, Utah, Oregon, Washington, and Wyoming. This is approximately half the total area of the Columbia River basin (219,000 square miles.) The Snake River is the largest tributary of the Columbia and is considered to have been the most important drainage for production of anadromous fish in the basin (NMFS 1995). Historically the Snake River is estimated to have produced between 39 and 45 percent of all Columbia River spring and summer Chinook, 55 percent of summer steelhead, and substantial numbers of fall Chinook, sockeye, and coho (NMFS 1995).

Hydroelectric dams have blocked access and inundated important spawning and rearing areas for Snake River salmon and steelhead. In all, approximately 2,500 miles of anadromous fish habitat have been lost to barrier dams and inundation. Still, approximately two-thirds of the historical habitat for spring/summer Chinook and steelhead remains accessible—roughly 6,300 stream miles out of 9,000 miles previously available (IDFG 1985).

Within the Snake River basin, the Salmon River is the largest river system, followed by the Clearwater River, both in Idaho. The Imnaha and Grande Ronde Rivers in Oregon and the Tucannon River in Washington are other major tributaries still available to anadromous fish.

Topography in the Snake River basin varies from 12,662 feet elevation at Mount Borah in the headwaters of the Pahsimeroi River to 340 feet at the confluence with the Columbia. Terrestrial habitats include high elevation interior deserts, alpine peaks, dense forests, and the deepest river canyon in North America. Land uses range from the largest contiguous wilderness in the lower 48 states to agriculture and urban areas.

Starting in the 1800s, dams that blocked anadromous fish from their habitat were constructed for irrigation, mining and milling, and hydropower. Construction of the Hell’s Canyon hydroelectric complex along the Idaho-Oregon border in the 1960s completed the extirpation of anadromous species in the Snake River and all tributaries above Hell’s Canyon Dam. Major tributaries upstream from Hells Canyon Dam that once supported anadromous fish include the Wildhorse, Powder, Burnt, Weiser, Payette, Malheur, Owyhee, Boise, Bruneau, and Jarbidge Rivers, and Salmon Falls Creek.

Dworshak Dam, completed in 1971, caused the extirpation of Chinook and steelhead runs in the North Fork Clearwater River drainage. Lewiston Dam, built in 1927 and removed in 1973, is believed to have caused the extirpation of native Chinook, but not steelhead, in the Clearwater drainage above the dam site. Harpster Dam, located on the South Fork Clearwater River at approximately RM 15, completely blocked both steelhead and Chinook from reaching spawning habitat from 1949 to 1963. The dam was removed in 1963 and fish passage was restored to approximately 500 miles of suitable spawning and rearing habitat.

2.2 Descriptions of ESUs and DPS and Life Histories

There are three salmonid ESUs in the Snake River Basin: Snake River spring/summer Chinook salmon and Snake River fall Chinook salmon (*Oncorhynchus tshawytscha*), and Snake River sockeye salmon (*Oncorhynchus nerka*). Snake River steelhead (*Oncorhynchus mykiss*) are designated as a DPS. This recovery plan is for Snake River spring/summer Chinook and steelhead. Separate recovery plans are being developed for Snake River fall Chinook and sockeye.

2.2.1 Snake River Spring/Summer Chinook ESU

Spring/summer Chinook in the Snake River basin form a distinct ESU. The ESU includes all naturally spawning populations of spring/summer Chinook in the mainstem Snake River and in the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River subbasins (57 FR 23458; June 3, 1992). The historical Snake River spring/summer Chinook ESU likely included populations in the Clearwater River drainage and extended above the Hells Canyon Dam complex (Figure 2-1). Habitat analyses and historical records of fish presence indicate that the Clearwater River basin and the area above Hells Canyon Dam supported several additional anadromous populations (ICTRT 2008). However, no biological data are available to assess the historical relationships among populations in the extirpated areas above the Hells Canyon Dam complex, including the potential that one or more additional ESUs may have existed (ICTRT 2007).

Adult spring and summer Chinook destined for the Snake River enter the Columbia River on their upstream spawning migration from February through March and arrive at their natal tributaries between June and August. Spawning occurs in August and September. Juveniles exhibit a river-type life history strategy, rearing in their natal streams during their first summer of life before migrating to the ocean. After reaching the ocean as smolts, the fish typically rear two to three years in the ocean before beginning their migration to their natal freshwater streams.

Since the late 1800s, the ESU has suffered dramatic declines due to heavy harvest pressures, habitat modification and loss, and likely inadvertent negative effects of hatchery practices. Further declines have occurred since the 1950s due to construction and operation of the hydropower system on the Snake and Columbia Rivers. As a result of these declines in abundance, Snake River spring/summer Chinook were listed as threatened under the Endangered Species Act on April 22, 1992 (57 FR 14658). The listing was reaffirmed on June 28, 2005 (70 FR 37160). Protective regulations for Snake River spring/summer Chinook were issued under section 4(d) of the ESA on July 10, 2000 (65 FR 42422). The Snake River spring/summer Chinook listing was developed in response to a biological review which concluded that Snake River spring/summer Chinook were "likely to become endangered in the foreseeable future" (Good et al. 2005).

Several prominent factors led to NMFS' conclusion that Snake River spring/summer Chinook are threatened: (1) aggregate abundance of naturally produced Snake River spring and summer Chinook runs had dropped to a small fraction of historical levels; (2) short-term projections were for a continued downward trend in abundance; (3) risks to individual subpopulations may be greater than the extinction risk to the species as a whole; (4) continuing disruption due to the impact of mainstem hydroelectric development; and (5) regional habitat degradation and risks associated with the use of outside hatchery stocks in particular areas (Good et al 2005).

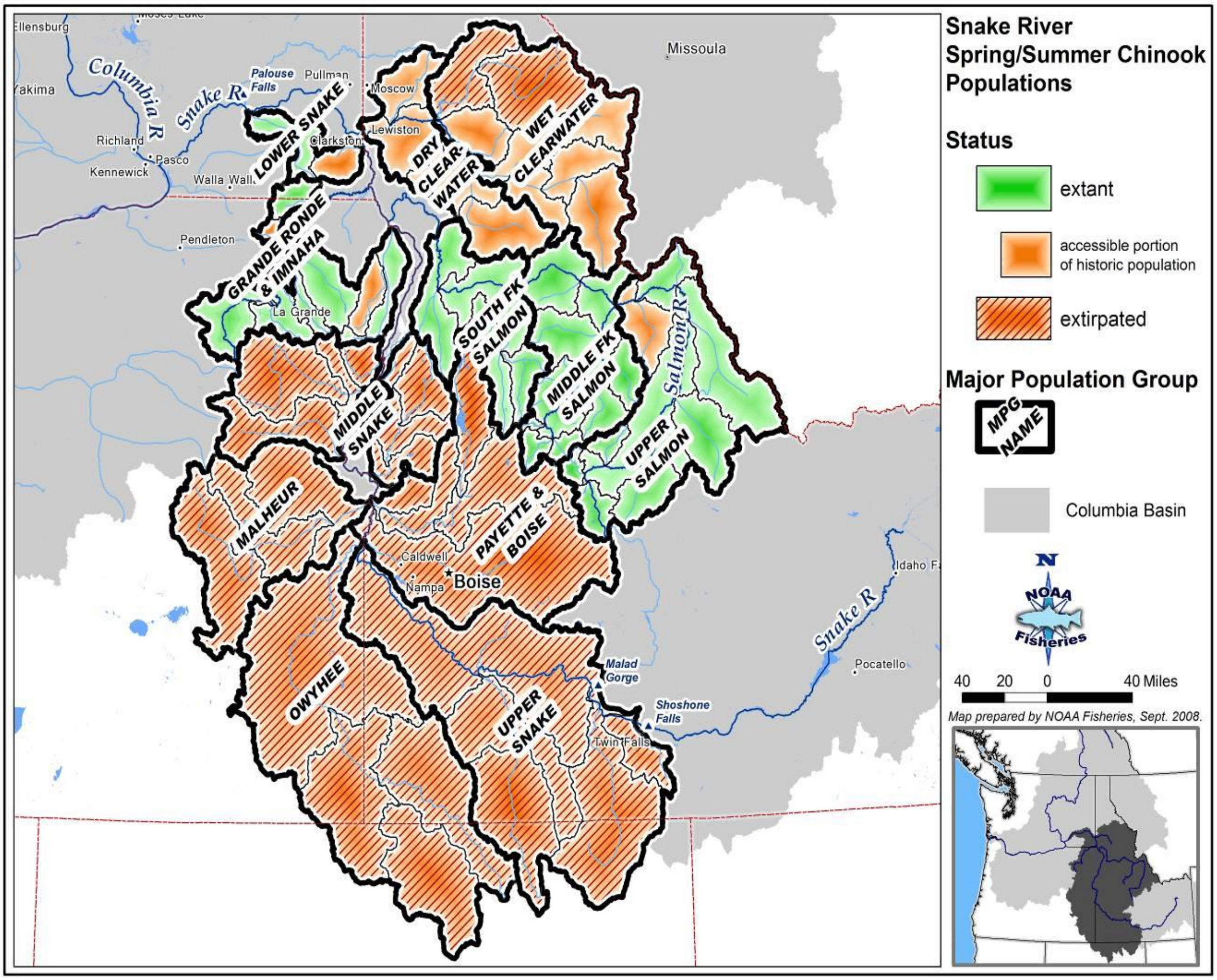

Figure 2-1. Snake River spring/summer Chinook ESU. Major population groups (MPGs) with extant populations and historical production areas that may have supported additional MPGs (Clearwater River drainage, above Hells Canyon drainages) (ICTRT 2008).

The ESU includes 15 artificial propagation programs: the Tucannon River, conventional and captive brood stock programs, the Lostine River, Catherine Creek, Lookingglass Creek, Upper Grande Ronde River, Imnaha River, and Big Sheep Creek programs in Oregon; and the South Fork Salmon River (McCall Hatchery), Johnson Creek, Lemhi River (captive rearing), Pahsimeroi River, East Fork Salmon River (captive rearing), West Fork Yankee Fork Salmon River (captive rearing), and Upper Salmon River (Sawtooth Hatchery) programs in Idaho (70 FR 37160; June 28, 2005).

2.2.2 Snake River Steelhead DPS

This inland steelhead DPS occupies the Snake River Basin of southeast Washington, northeast Oregon and Idaho (Figure 2-2). The DPS includes all naturally spawned populations of steelhead in the Snake River and its tributaries (62 FR 43937; August 18, 1997). Several artificial propagation programs are considered part of the DPS: the Tucannon River natural stock, the North Fork Clearwater River stock reared at Dworshak National Fish Hatchery and Clearwater Fish Hatchery and released in the Clearwater and Salmon Rivers, East Fork Salmon River local stock, and the Little Sheep Creek/Imnaha River Hatchery steelhead hatchery programs (71FR 834; January 5, 2006). Snake River steelhead are known to spawn and rear in all tributaries used by Snake River spring/summer Chinook, as well as many additional tributaries, some of which are much smaller than those used by spring/summer Chinook.

Snake River steelhead were originally listed as threatened on August 18, 1997 (62 FR 43937). Recently, NMFS revised its species determinations for West Coast steelhead under the ESA, delineating steelhead-only distinct population segments (DPSs). The former steelhead ESU included both the anadromous steelhead and resident, non-anadromous, rainbow trout. The steelhead DPS does not include rainbow trout, which are under the jurisdiction of USFWS. The Federal Register Notice contains a more complete explanation of this listing decision. NMFS listed the Snake River steelhead DPS as threatened on January 5, 2006 (71 FR 834).

The most prominent factors leading to NMFS' conclusion that Snake River steelhead were threatened include: (1) sharp decline in natural stock returns beginning in the mid-1980s; (2) declines for both A-run and B-run steelhead in wild and natural stock areas; (3) the high proportion of hatchery fish in the run, particularly because of the lack of information on the actual contribution of hatchery fish to natural spawning; (4) threats to genetic integrity from past and present hatchery practices; (5) widespread habitat degradation and flow impairment throughout the Snake River basin; and (6) substantial modification of the seaward migration corridor by hydroelectric power development on the Snake and mainstem Columbia Rivers (Good et al. 2005).

Snake River steelhead are genetically differentiated from other Interior Columbia steelhead populations, as they spawn at higher altitudes (up to 2,000 m) and after longer freshwater migrations (up to 1,500 km) (Busby et al. 1996). Like steelhead in other areas, these fish exhibit a wide range of life-history strategies, including varying times of freshwater rearing or ocean residence, or elimination of an ocean residence altogether.

Snake River steelhead migrate a substantial distance from the ocean and use high-elevation tributaries (typically 1,000–2,000 m above sea level) for spawning and juvenile rearing. They occupy habitat that is considerably warmer and drier (on an annual basis) than other steelhead DPSs. Snake River steelhead are generally classified as summer run, based on their adult run-timing patterns. Summer-run steelhead enters the Columbia River from late June to October. After holding over the winter, summer-run steelhead spawns the following spring (typically from March to May) (Good et al. 2005). Emergence occurs by early June in low elevation streams and as late as mid July at higher elevations. Snake River steelhead usually smolt at age-2 or age-3 years. Steelhead typically reside in marine waters for one to three years before returning to their natal stream to spawn at 4 or 5 years of age. Steelhead are iteroparous, or capable of spawning more than once before death. However, it is rare for steelhead to spawn more than twice before dying and most that do so are females (Nickelson et al. 1992). Resident *O. mykiss* are also present in many of the drainages used by Snake River steelhead.

Snake River steelhead comprise two groups, an A-run and a B-run, based on migration timing, ocean-age and adult size. Generally, A-run steelhead are smaller, have a shorter freshwater and ocean residence, and begin their upriver migration earlier in the year. B-run steelhead are larger, spend more time rearing in both fresh water and the ocean, and appear to begin their upriver migration later in the year. A-run steelhead is believed to occur throughout the steelhead-bearing streams of the Snake River basin and the inland Columbia River. Only the Clearwater, Middle Fork Salmon, and South Fork Salmon Rivers are believed to produce B-run steelhead (IDFG 1994). Steelhead populations discussed in this Plan contain both A-run and B-run fish.

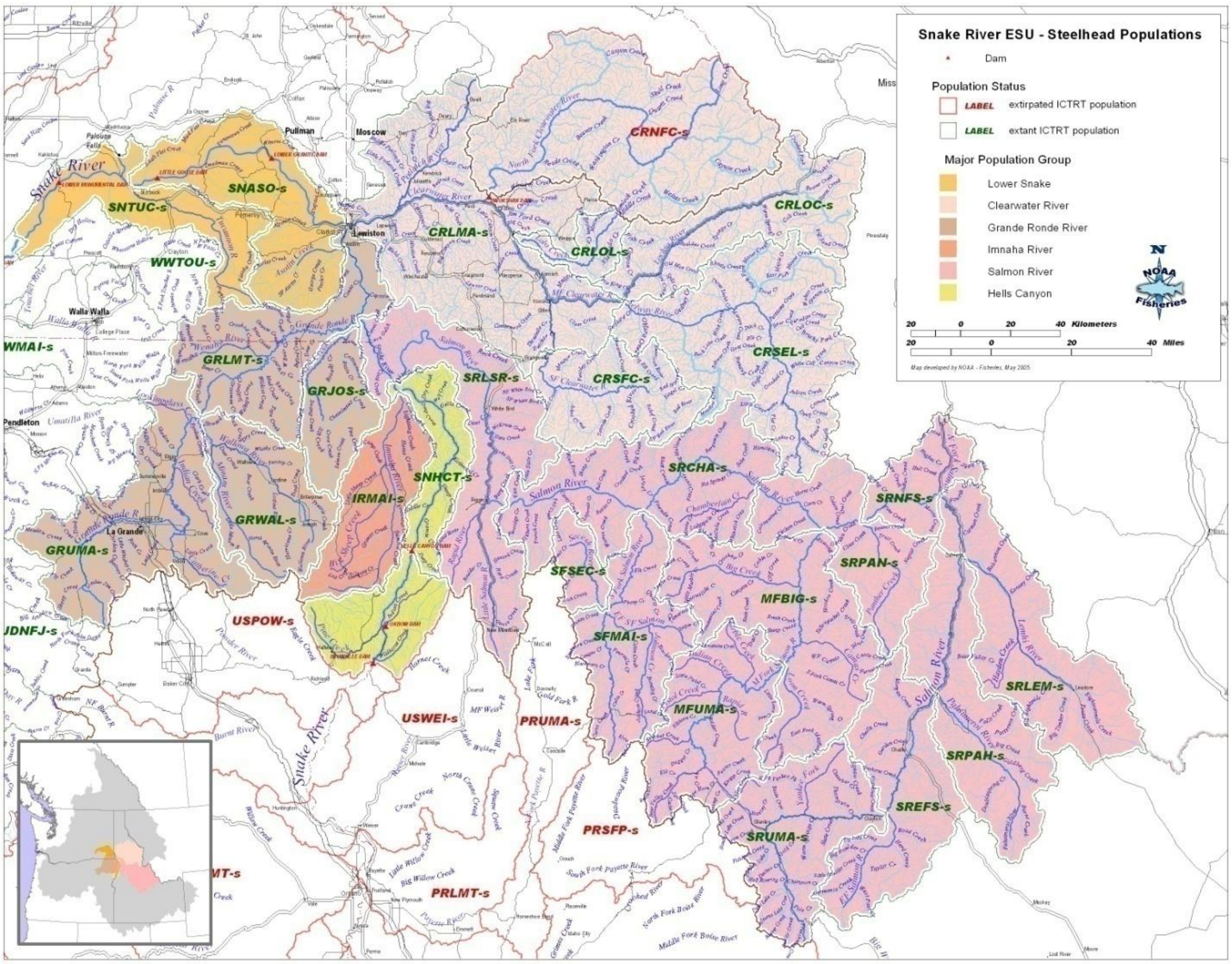

Figure 2-2. Snake River Steelhead DPS with Major Population Groups and extant populations (labeled in green) and extirpated populations (labeled in red). [Replace with better map]

Several propagation facilities within the ESU are operated to mitigate for dams on the Snake River (NMFS 1996). The Lower Snake River Compensation Plan (LSRCP) was developed to mitigate fishery losses due to four dams on the lower Snake River (Ice Harbor, Lower Monumental, Little Goose, and Lower Granite Dams). The LSRCP steelhead facilities include Dworshak and Hagerman National Fish Hatcheries, and Clearwater, Sawtooth, and Magic Valley Hatcheries. The Hells Canyon Complex forms the second series of dams (Hells Canyon, Oxbow, and Brownlee Dams); steelhead mitigation facilities for these dams include Oxbow, Pahsimeroi, and Niagara Springs Steelhead Hatcheries.

2.3 Salmon and Steelhead Population Structure Adopted for Recovery Planning

2.3.1 Salmonid Population Structure

Salmonid biological structure is hierarchical in the sense that the species' long-term persistence depends on a complex set of characteristics. These characteristics include homing propensity, distribution across the landscape, and diverse genetic, life history, and morphological characteristics that can be seen to "add up" from the smallest spawning populations in tributary creeks and streams to larger groups of populations and ultimately ESU/DPS and species.

Recovery planning efforts focus on this biologically based hierarchy, which reflects the apparent degree of connectivity between the fish in each of these levels (Figure 2-3). ESU/DPS and populations are formally defined for listing, delisting, and recovery planning purposes. The ICTRT identified an additional layer in this hierarchy, the major population group or MPG, between the population and species levels. These three levels are defined as follows:

- **Evolutionarily Significant Units for salmon (ESU):** Two criteria define an ESU of salmon listed under the ESA: 1) it must be substantially reproductively isolated from other conspecific units, and 2) it must represent an important component of the evolutionary legacy of the species (Waples 1991). ESUs may contain multiple populations that are connected by some degree of migration, and hence may have broad geographic areas, transcending political borders.

- **Distinct Populations Segments for steelhead (DPS):** Two criteria also define a DPS of steelhead listed under the ESA: 1) the group must be discrete from other populations and 2) it must be significant to its taxon. (The DPS and ESU criterion are similar. Steelhead were listed using the DPS criteria.)

- **Major Population Groups (MPG):** Within ESUs, independent populations can be grouped into larger aggregates that share similar genetic, geographic (hydrographic), and/or habitat characteristics (McClure et al. 2003). These "major groupings" are groups of populations that are isolated from one another over a longer time scale than that defining the individual populations, but which retain some degree of connectivity greater than that between ESUs. The ICTRT defines this level in the hierarchy as major population groups (MPGs). These MPGs are analogous to "strata" as defined by the Lower Columbia-Upper Willamette TRT and "geographic regions" described by the Puget Sound TRT.

- **Independent Populations:** McElhany et al. (2000) defined an independent population as: *"…a group of fish of the same species that spawns in a particular lake or stream (or portion thereof) at a particular season and which, to a substantial degree, does not interbreed with fish from any other group spawning in a different place or in the same place at a different season. For our purposes, not interbreeding to a 'substantial degree' means that two groups are considered to be independent populations if they are isolated to such an extent that exchanges of individuals among the populations do not substantially affect the population dynamics or extinction risk of the independent populations over a 100-year time frame."*

Independent populations are combined to form alternative recovery scenarios for MPG and subsequently ESU viability – and, ultimately, they are the objects of recovery efforts.

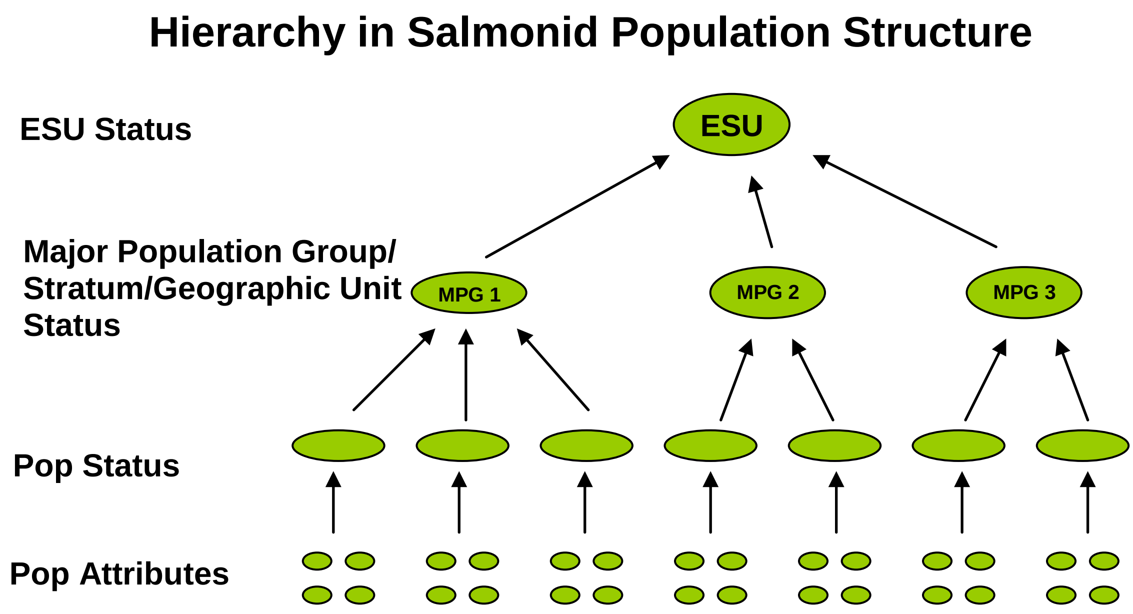

Figure 2-3. Hierarchical levels of ESA-listed ESU, MPG, and independent populations.

NMFS adopted the ESU/DPS, MPG, and population structure defined by the ICTRT for purposes of Snake River salmon and steelhead recovery planning. These groups were defined based on genetic, geographic (hydrographic) and habitat considerations (McClure et al. 2003) with guidance provided in the NMFS technical memorandum, *Viable salmon populations and the recovery of evolutionarily significant units* (McElhany et al. 2000).

2.3.2 Population Identification

As one of its first tasks in recovery planning, the ICTRT delineated independent populations within the listed ESUs in the Interior Columbia Basin, including those in the Snake River Basin. This delineation of population boundaries is critical for effective conservation planning, since incorrect lumping or splitting of populations (or portions of populations) can provide an inaccurate picture of population status. Over- or underestimating the true status (abundance/productivity, spatial structure/diversity) may lead to failed recovery efforts. Similarly, if two "true" populations are treated as a single unit, the status of one may mask the other, potentially leading to the loss of one of the populations (McClure et al. 2003).

The ICTRT assessed a variety of information sources to delineate independent populations (McClure et al. 2003). They initially classified major groups of populations within ESUs, and then identified independent populations within major groups. They used a variety of data types to define MPGs and independent populations. However, in no case was the entire array of desired information available to inform their decision process. They relied heavily on genetic information, distances between spawning areas related to dispersal (straying distance) as evidence of reproductive isolation, and habitat characteristics. Phenotypic (life history and morphological) characteristics were also considered for distinction at the population level. In addition, they considered two demographic factors. First, because the goal was to identify demographically independent populations, they examined the correlation in abundance time series between areas. Second, they considered historical population size in determining potential population capacity (McClure et al. 2003).

2.3.3 Snake River Spring/Summer Chinook ESU

The Snake River Spring/Summer Chinook ESU includes those fish that spawn in the Snake River drainage and its major tributaries, including the Salmon and Grande Ronde Rivers, and that complete their adult, upstream migration (passing Bonneville Dam) between March and July. These stream-type fish rear in fresh water for slightly more than a year before smoltification and seaward migration.

The ICTRT (McClure et al. 2003) identified 32 populations in this ESU (Figure 2-4), including 28 extant populations, 1extirpated population (Panther Creek), and 3 functionally extirpated populations (Big Sheep Creek, Lookinglass Creek and Asotin Creek). The populations are grouped into five major population groups, distributed across the ESU from southeastern Washington through northeastern Oregon and central Idaho.

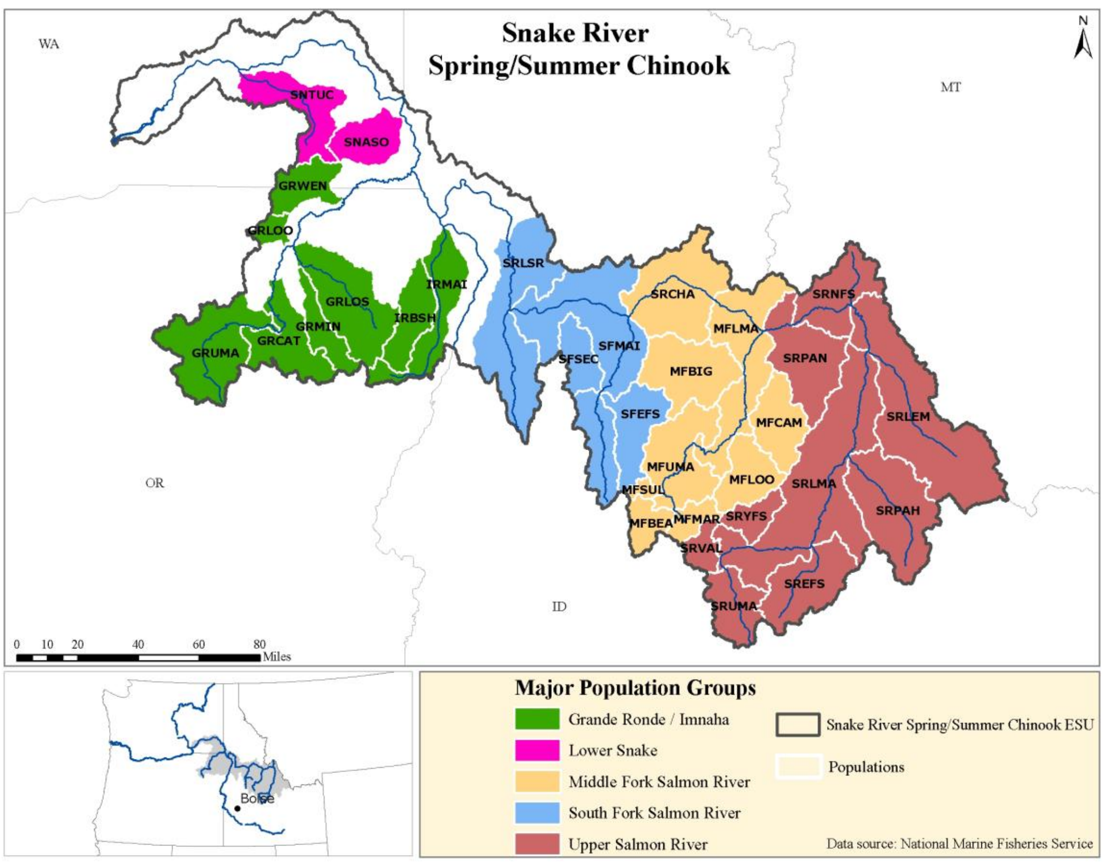

Figure 2-4. Major Population Groups and independent populations in the Snake River Spring/Summer Chinook Salmon Evolutionarily Significant Unit.

Table 2-1 summarizes the current viability status of the Snake River spring/summer Chinook MPGs and independent populations within Idaho.

Table 2-1. Major Population Groups and independent populations within the Snake River Spring/Summer Chinook ESU VSP parameter risks. Risks shown in *italics* are assumed best (lowest) possible risk level pending quantitative abundance/productivity viability assessments.

Major Population Group	Population Name	Pop. Size and Complexity	VSP Parameter Risk		Viability Status (Meets Viability Criteria?)	
			A/P	SS/D	Population	MPG
South Fork Salmon River MPG	Little Salmon River	Intermediate	*Moderate*	High	Does Not Meet	Does Not Meet
	South Fork Salmon River mainstem	Large	High	Moderate	Does Not Meet	
	Secesh River	Intermediate	High	Low	Does Not Meet	
	East Fork South Fork Salmon River	Large	High	Low	Does Not Meet	
Middle Fork Salmon River MPG	Chamberlain Creek	Intermediate	High	Low	Does Not Meet	Does Not Meet
	Middle Fork Salmon River below Indian Creek	Basic	*High*	*Low*	Does Not Meet	
	Big Creek	Large	High	Moderate	Does Not Meet	
	Camas Creek	Basic	High	Moderate	Does Not Meet	
	Loon Creek	Basic	High	Moderate	Does Not Meet	
	Middle Fork Salmon River above Indian Creek	Intermediate	*High*	*Low*	Does Not Meet	
	Sulphur Creek	Basic	High	Moderate	Does Not Meet	
	Bear Valley Creek	Intermediate	High	Low	Does Not Meet	
	Marsh Creek	Basic	High	Low	Does Not Meet	
Upper Salmon River MPG	North Fk Salmon River	Basic	*High*	*High*	Does Not Meet	Does Not Meet
	Lemhi River	Very Large	High	High	Does Not Meet	
	Salmon River Lower Mainstem	Very Large	High	Low	Does Not Meet	
	Pahsimeroi River	Large	High	High	Does Not Meet	
	East Fk Salmon River	Large	High	High	Does Not Meet	
	Yankee Fk Salmon River	Basic	*High*	High	Does Not Meet	
	Valley Creek	Basic	High	Moderate	Does Not Meet	
	Salmon River Upper Mainstem	Large	High	Moderate	Does Not Meet	
	Panther Creek	Intermediate	na	na	Extirpated	

2.3.4 Snake River Steelhead MPGs and Populations

The ICTRT identified 29 steelhead populations in the Snake River steelhead DPS. The populations form six major population groups distributed across the DPS from southeastern Washington through northeastern Oregon and central Idaho (Figure 2-5). Of these populations, 25 are extant, 1 (North Fork Clearwater) is blocked from its historic habitat, and 3 in the Hells Canyon MPG are extirpated.

Both genetic distances and distances between spawning aggregates played an important role in defining the major groupings. Life history, habitat, and environmental considerations, however, played a larger role at a finer scale. Importantly, allozyme data (Winans unpublished; Marshall unpublished) suggested that spatial distance was more predictive of differentiation than run-type. In analyses of both A- and B-run fish, within-basin genetic distances are uniformly lower than those between basins (McClure et al. 2003).

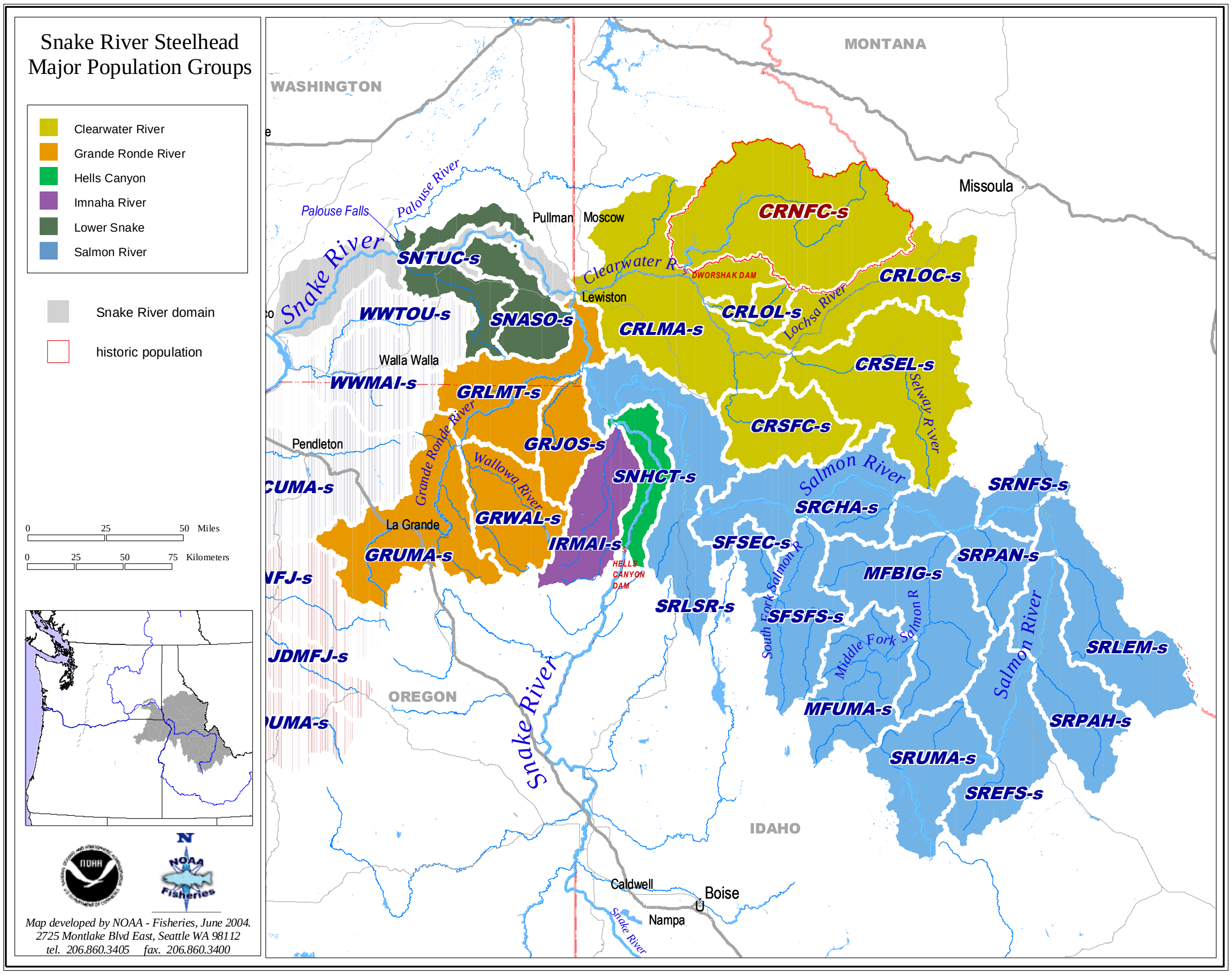

Figure 2-5. **Major populations groups and independent populations within the Snake River steelhead Distinct Population Segment.**

Table 2-2 summarizes the current viability status of Snake River steelhead MPGs and independent populations within Idaho.

Table 2-2. Major Population Groups and independent populations within the Snake River steelhead DPS Viable Salmonid Population (VSP) parameter risks. Risks shown in italics are estimated based on aggregate A- or B-run abundance/productivity (A/P) assessments. Some populations may be treated as a lower size category with respect to abundance/productivity criteria due to core area considerations (shown in parenthesis).

Major Population Group	Population Name	Population Size & Complexity	VSP Parameter Risk		Status (Meets viability Criteria?)	
			A/P	SS/D	Population	MPG
Lower Snake River MPG	Tucannon River	Intermediate	High	Moderate	Does Not Meet	Does Not Meet
	Asotin Creek	Basic	High	Moderate	Does Not Meet	
Grande Ronde River MPG	Upper Grande Ronde River	Large	Very Low	Inc.	Unknown	Does Not Meet
	Wallowa River	Intermediate	Moderate	Low	Does Not Meet	
	Lower Grande Ronde River	Intermediate	*Moderate*	Low	Does Not Meet	
	Joseph Creek	Basic	Very Low	Inc.	Unknown	
Imnaha River MPG	Imnaha River	Intermediate	*Moderate*	Low	Does Not Meet	Does Not Meet
Clearwater River MPG	Lower Mainstem	Large	*Moderate*	Low	Does Not Meet	Does Not Meet
	North Fork	Large	Blocked	Blocked	Does Not Meet	
	Lolo Creek	Basic	*High*	Moderate	Does Not Meet	
	Lochsa River	Intermediate	*High*	Low	Does Not Meet	
	Selway River	Intermediate	*High*	Low	Does Not Meet	
	South Fork	Intermediate	*High*	Moderate	Does Not Meet	
Salmon River MPG	Little Salmon River	Intermediate	*Moderate*	Moderate	Does Not Meet	Does Not Meet
	Secesh River	Basic	*High*	Low	Does Not Meet	
	South Fork Salmon	Intermediate	*High*	Low	Does Not Meet	
	Chamberlain Creek	Basic	*Moderate*	Low	Does Not Meet	
	Lower Middle Fork	Intermediate	*High*	Low	Does Not Meet	
	Upper Middle Fork	Intermediate	*High*	Low	Does Not Meet	
	Panther Creek	Basic	*Moderate*	High	Does Not Meet	
	North Fork Salmon	Basic	*Moderate*	Moderate	Does Not Meet	
	Lemhi River	Intermediate	*Moderate*	Moderate	Does Not Meet	
	Pahsimeroi River	Intermediate	*Moderate*	Moderate	Does Not Meet	
	East Fork Salmon	Intermediate	*Moderate*	Moderate	Does Not Meet	
	Upper Salmon Mainstem	Intermediate	*Moderate*	Moderate	Does Not Meet	
Hells Canyon Tributaries MPG	Hells Canyon Powder River Burnt River Weiser River	Note: With the exception of occupancy in some small tributaries in Hells Canyon downstream of Hells Canyon Dam, this MPG is entirely extirpated.				Extirpated

2.4 Critical Habitat

Critical habitat for Snake River spring/summer Chinook was designated on December 28, 1993 (58 FR 68543) and revised October 25 of 1999 (64 FR 57399). The designated critical habitat for Snake River spring/summer Chinook consists of river reaches of the Columbia, Snake, and Salmon Rivers and all the tributaries of the Snake and Salmon Rivers (except the Clearwater River) presently or historically accessible to Snake River spring/summer Chinook (except above natural falls and the Hells Canyon Dam).

On September 2, 2005, NMFS published a final rule (70 FR 52630) to designate critical habitat for Snake River steelhead and 12 other species of salmon and steelhead (not including Snake River spring/summer Chinook). These critical habitat designations, which total 8,049 miles of stream, became effective January 2, 2006. The Critical Habitat Assessment Review Team (CHART) (NMFS 2005) made critical habitat designations for this group of ESUs and DPSs by rating the conservation value of all 5th-field hydrologic unit codes (HUCs) supporting populations of Snake River spring/summer Chinook and steelhead.

Essential habitat for spring/summer Chinook and summer steelhead consists of (1) spawning and juvenile rearing areas; (2) juvenile migration corridors; (3) areas for growth and development to adulthood, and (4) adult migration corridors (58 FR 68543). Essential features of these habitats include adequate substrate (especially spawning gravel), water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and suitable migration conditions. Primary constituent elements (PCEs) consist of the physical and biological elements identified as essential to support one or more life stages of salmon or steelhead, and therefore are essential to the conservation of the species. Table 2-3 lists the PCEs used to assess critical habitat for 12 salmon and steelhead species (NMFS 2005).

Table 2-3. Types of Sites and Essential Physical and Biological Features Designated as Primary Constituent Elements (PCEs) for salmon and steelhead, and the Life Stage Each PCE Supports (NMFS 2005).

Site	Essential Physical & Biological Features	ESU Life Stage
Freshwater spawning	Water quality, water quantity, and substrate	Spawning, incubation and larval development
Freshwater rearing	Water quantity and floodplain connectivity	Juvenile growth and mobility
	Water quality and forage	Juvenile development
	Natural cover[a]	Juvenile mobility and survival
Freshwater Migration	Free of artificial obstructions, water quality, quantity, and natural cover[b]	Juvenile and adult mobility and survival
Estuarine areas	Free of obstructions, water quality and quantity, and salinity	Juvenile and adult physiological transitions between salt and fresh water
	Natural cover[a], forage[b], and water quantity	Growth and maturation
Nearshore marine areas	Free of obstruction, water quality and quantity, natural cover[a] and forage[b]	Growth and maturation, survival
Offshore marine areas	Water quality and forage[b]	Growth and maturation

[a] natural cover includes shade, large wood, logjams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

[b] forage includes aquatic invertebrate and fish species that support growth and maturation.

Figure 2-6 depicts those streams designated as critical habitat for Snake River spring/summer Chinook and steelhead in Idaho.

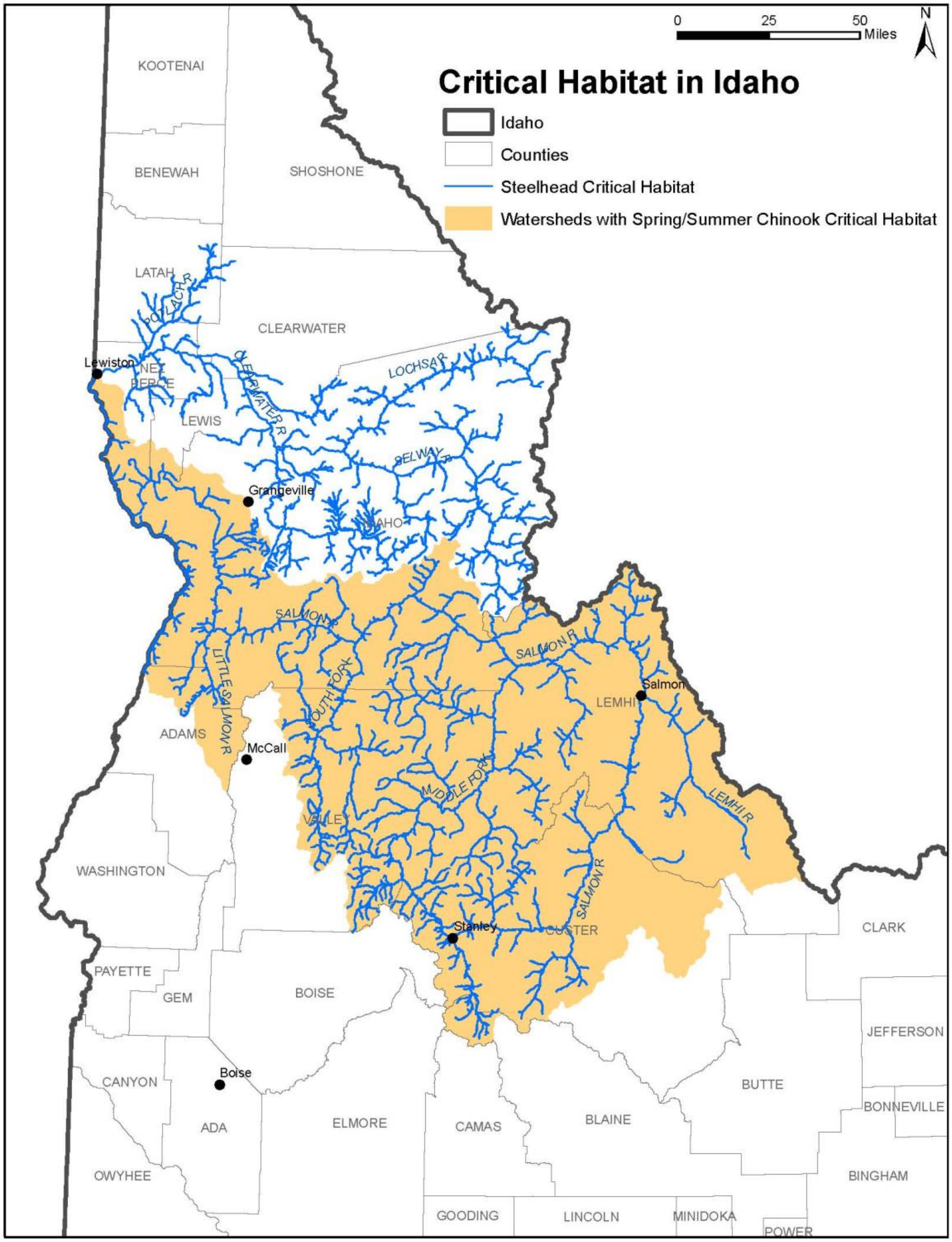

Figure 2-6. Critical Habitat Designated for Salmon and Steelhead in Idaho. Critical habitat for spring/summer Chinook includes all stream reaches presently or historically accessible to the species within the ESU boundaries shown in orange.

Chapter 3 ▪ Recovery Goal and Delisting Criteria

This chapter describes the recovery goals and the delisting criteria that NMFS will use in future reviews of the Idaho Snake River spring/summer Chinook and steelhead MPGs and populations. The reviews will contribute to NMFS' larger objective of delisting the Snake River spring/summer Chinook ESU and Snake River steelhead DPS.

3.1 Recovery Goal and Delisting Criteria

Our primary goal is to support removal of the Snake River spring/summer Chinook ESU and steelhead DPS from the threatened and endangered species list. This requires that the populations reach the levels of biological viability defined by the ICTRT and adopted by NMFS as delisting criteria in this Plan. In the context of recovery, delisting criteria and viability criteria are considered synonymous. Achieving ICTRT biological viability status at the population and MPG levels is needed to ensure the species can be considered at low risk of extinction and a candidate for delisting. We applied the viability criteria to generate the "desired status" for the salmon and steelhead populations in Snake River subbasins.

3.1.1 Biologically Based Viability Criteria and Approach

NMFS' technical recovery teams recommend biologically based viability criteria for the listed salmonid species. They used principles described in a NMFS' technical memorandum, *Viable Salmon Populations and the Recovery of Evolutionarily Significant Units* (McElhany et al. 2000). Viable salmonid populations (VSPs) are defined in terms of four parameters: abundance, population productivity or growth rate, population spatial structure, and life history and genetic diversity. A viable ESU is defined as naturally self-sustaining. Viability criteria identify the metrics and thresholds that may be used to determine the status of a population and the viability risk.

ESU-level viability criteria consider the appropriate distribution and characteristics of component populations to maintain a viable ESU in the face of longer-term ecological and evolutionary processes.

The general approach identified for viability criteria has five essential elements:

> ***Stratified Approach:*** Life history and ecological complexity that historically existed should have a high probability of persistence. The ICTRT stratified the Snake River ESUs into groups based on ecoregion characteristics, life history types (e.g., run timing) and other geographic and genetic considerations.
>
> ***Viable Populations:*** Some individual populations within an MPG should have persistence probabilities consistent with a high probability of MPG persistence. The ICTRT defined high persistence probability based on the presence of at least two, or one half of historical populations, whichever is greater, with a negligible risk of extinction.

Representative Populations: Representative populations need to achieve viability criteria or be maintained, but not every historical population needs to meet viability criteria. Viable combinations of populations should include "core" populations that are highly productive, "legacy" populations that represent historical genetic diversity, and dispersed populations that minimize susceptibility to catastrophic events.

Non-deterioration: No population should be allowed to deteriorate until ESU recovery is assured, and all extant populations must be maintained. Current populations and population segments must be preserved. Recovery measures will be needed in most areas to arrest declining status and offset the effects of future impacts.

Safety Factors: Because not all attempts will be successful, higher levels of recovery should be attempted in more populations than the minimum needed to achieve ESU viability. Recovery efforts must target more than the minimum number of populations and more than the minimum population levels thought to ensure viability. Some populations should be highly viable.

During recovery planning, viability objectives are being recommended at the ESU, MPG, and component population levels as defined by the ICTRT (McClure et al. 2003). Assessments of viability at these different levels follow guidelines and approaches recommended by the ICTRT. The ICTRT's ESU-level viability criteria are designed to assess risk for abundance/productivity and spatial structure/diversity at the population level. These assessments are then "rolled up" to arrive at composites for the MPG and ESU levels.

3.1.1.1 Species-Level Criteria

The ICTRT determined that, because MPGs are geographically and genetically cohesive groups of populations, they are critical components of ESU-level spatial structure and diversity. Having all MPGs within an ESU at low risk provides the greatest probability of persistence of any ESU. The box below shows ESU-level viability criteria defined by the ICTRT.

ESU Viability Criteria (from Cooney et al. 2005)

- All extant MPGs and any extirpated MPGs critical for proper functioning of the ESU must be at low risk.
- ESUs that contained only one MPG historically or that include only one MPG critical for proper function must meet the following criteria:
    a. The single MPG must meet all the requirements to be at low risk (see above). In addition:
    b. Two-thirds or more of the populations within the MPG historically must meet minimum viability standards; AND
    c. At least two populations must meet the criteria to be "Highly Viable."

Extirpated areas will be evaluated to determine whether extirpated MPGs are critical for proper functioning of the ESU using the following considerations:

- Likely demographic (abundance and productivity) contribution of the MPG and its component populations to the ESU.
- Spatial role of the MPG in the ESU (e.g. does the extirpated MPG create a gap in the distribution of the ESU?)
- Likely contribution to overall ESU diversity (e.g. does the extirpated MPG occupy habitats that are substantially different from other habitats currently occupied in the ESU?)

3.1.1.2 MPG-Level Criteria

The ICTRT recommended Major Population Group level risk criteria that assess the level of risk associated with its component populations. While individual populations meeting viability criteria are expected to have low risk of extinction, these additional, MPG-level criteria ensure robust functioning of the population group and provide resilience to catastrophic loss of one or more populations. In developing these criteria, the ICTRT assumed that catastrophes do not increase dramatically in frequency, that populations are not lost permanently (due to catastrophe or anthropogenic impacts) and that permanent reductions in productivity, including long-term, gradual reductions in productivity do not occur.

MPG-Level Viability Criteria
(ICTRT 2007b)

The following five criteria should be met for an MPG to be regarded as low risk (viable):

1. At least one-half of the populations historically within the MPG (with a minimum of two populations) should meet viability standards.
2. At least one population should be categorized as being “Highly Viable.”
3. Viable populations within an MPG should include some populations classified (based on historical intrinsic potential) as “Very Large,” “Large,” or “Intermediate” generally reflecting the proportions historically present within the MPG. In particular, Very Large and Large populations should be at or above their composite historical fraction within each MPG.
4. All major life history strategies (e.g., spring and summer run timing) that were present historically within the MPG should be represented in populations meeting viability requirements.
5. Remaining MPG populations should be maintained with sufficient abundance, productivity, spatial structure, and diversity to provide for ecological functions and to preserve options for ESU/DPS recovery.

3.1.1.3 Population-Level Criteria

McElhany et al. (2000) state that a viable population should be large enough to:

- have high probability of surviving environmental variation observed in the past and expected in the future,
- be resilient to environmental and anthropogenic disturbances,
- maintain genetic diversity, and
- support/provide ecosystem functions.

To address these guidelines, the ICTRT grouped specific population level criteria into two categories: measures addressing abundance and productivity, and measures addressing spatial structure/diversity considerations. They also developed a framework for compiling an aggregate risk score for a population based on the results of applying the individual criteria.

Population Abundance and Productivity

Abundance refers to the average number of spawners in a population over a generation or more. Productivity, or population growth rate, refers to the performance of the population over time in terms of recruits produced per spawner.

Viable populations should demonstrate sufficient productivity to support a net replacement rate of 1:1 or higher at abundance levels established as long-term targets. Productivity rates at relatively low numbers of spawners should, on average, be sufficiently greater than 1.0 to allow the population to rapidly return to abundance target levels. Following guidelines from McElhany et al. (2000), the ICTRT identified the following objective for population abundance and productivity:

> *Abundance should be high enough that 1) in combination with intrinsic productivity, declines to critically low levels would be unlikely assuming recent historical patterns of environmental variability; 2)compensatory processes provide resilience to the effects of short-term perturbations; and, 3) subpopulation structure is maintained (e.g., multiple spawning tributaries, spawning patches, life history patterns).*

The ICTRT used the viability curve concept (e.g., LC/WTRT 2003) as a framework for defining population-specific abundance and productivity levels to meet this objective. A viability curve describes those combinations of abundance and productivity that yield a particular risk threshold. The two parameters are linked relative to extinction risks associated with short-term environmental variability. This approach recognizes that relatively large populations are more resilient in the face of year-to-year variability in overall survival rates than smaller populations. Populations with relatively high intrinsic productivity — the expected ratio of spawners to their parent spawners at low levels of abundance — are also more robust at a given level of abundance than populations with lower intrinsic productivity.

The ICTRT generated viability curves for each population that defined different combinations of abundance and productivity. Under this approach, a combination of high abundance and moderate productivity could provide the same extinction risk as a combination of lower abundance and higher productivity. The combinations of abundance and productivity falling above the curve would represent a lower extinction risk, while the combinations falling below the curve would represent a higher risk. The ICTRT developed different viability curves corresponding to a range of extinction risks over a 100-year period: less than 1 percent (very low), less than 5 percent (low), less than 25 percent (moderate), and greater than 25 percent (high). It targeted population-level recovery strategies to achieve less than a 5 percent (low) risk of extinction in a 100-year period. This is consistent with the VSP guidelines and conservation literature (McElhany et al. 2000; NRC 1995; ICTRT 2007b).

Populations were grouped into four size categories based on historical capacity, represented by the weighted intrinsic potential area within the population boundaries. To determine quantity and quality of salmon and steelhead habitat within defined populations, the ICTRT developed a model for calculating intrinsic spawning habitat potential (Appendix C of ICTRT Viability Criteria 2007). This metric enabled the ICTRT to quantify and qualify potential habitat based on the relationship of spawning habitat use and local geo-physical features. A Geographic Information System (GIS) was used for the compilation of ecological data, and model development and output. Datasets describing spawning distribution and instream habitat characteristics were key in developing the relationship. After spatial data acquisition, model parameters were established by comparing mapped salmon and steelhead distribution to stream physiography.

The ICTRT determined that abundance levels below 500 individuals for any population would pose unacceptable risk for inbreeding depression and other genetic concerns (McClure et al. 2003), and established a minimum abundance threshold of 500 individuals for the basic size populations. Higher spawning threshold sizes were established incrementally for the three larger population sizes. Viability curves for all four size categories were truncated at the minimum abundance threshold level. Populations were also categorized by their historic spatial distribution pattern and complexity. This analysis was used to identify the abundance and productivity relationships for the different populations that would result in a probability of low risk of extinction within 100 years. Figure 3-1 shows an example of an Abundance/Productivity viability curve used to test viability.

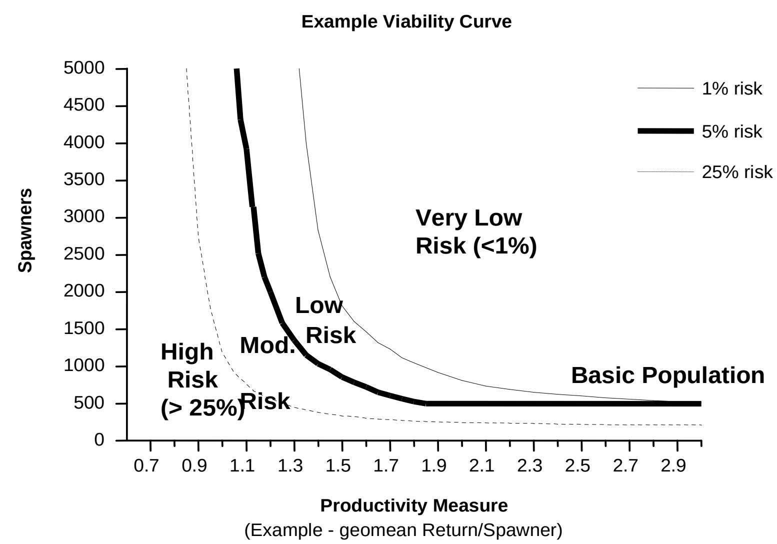

Figure 3-1. Example of an Abundance/Productivity Viability Curve.

Population Spatial Structure and Diversity

Spatial structure and diversity considerations are combined in the evaluation of viability because they are closely integrated. Spatial structure concerns a population's geographic distribution and the processes that affect that distribution. Diversity refers to the distribution of genetic, life history, and phenotypic variation within and among populations.

Distribution influences a population's viability because populations with restricted distribution and few spawning areas are at a higher risk of extinction due to catastrophic environmental events than are populations with more widespread and complex spatial structures. A population with a complex spatial structure, including multiple spawning areas, may experience more opportunity for gene flow, developmental substructure, and life history diversity. ICTRT delineated major and minor spawning areas for each population based on aggregates of stream reaches with intrinsic potential.

Population-level diversity is similarly important for long-term persistence. Populations exhibiting greater diversity are generally more resilient to short-term and long-term environmental changes. Phenotypic and life history diversity allow populations to use a wider array of environments and protect populations against short-term temporal and spatial environmental changes. Underlying diversity provides the ability to survive long-term environmental changes.

McElhany et al. (2000) provide a number of guidelines for the spatial structure and diversity of viable salmonid populations that consider these principles (Figure 3-2).

Viable Salmonid Populations Spatial Structure and Diversity Guidelines (McElhany et al. 2000)

Spatial Structure

1. Habitat patches should not be destroyed faster than they are naturally created.
2. Natural rates of straying among subpopulations should not be substantially increased or decreased by human actions.
3. Some habitat patches should be maintained that appear to be suitable or marginally suitable, but currently contain no fish.
4. Source subpopulations should be maintained.
5. Analyses of population spatial processes should take uncertainty into account.

Diversity

1. Human-caused factors such as habitat changes, harvest pressures, artificial propagation, and exotic species introduction should not substantially alter variation in traits such as run timing, age structure, size, fecundity, morphology, behavior, and molecular genetic characteristics.
2. Natural processes of dispersal should be maintained. Human-caused factors should not substantially alter the rate of gene flow among populations.
3. Natural processes that cause ecological variation should be maintained.
4. Population status evaluations should take uncertainty about requisite levels of diversity into account.

Figure 3-2. Viable salmonid population spatial structure and diversity guidelines (McElhany et al. 2000).

The ICTRT identified two primary goals that spatial structure and diversity criteria should address: 1) maintaining natural rates and levels of spatially mediated processes, and 2) maintaining natural patterns of variation. They also provided a format outlining guidelines for achieving these goals. The format identifies mechanisms, factors, and metrics appropriate for assessing population status. Table 3-2 summarizes the associations between these goals, mechanisms, factors, and metrics. Some viability metrics include variable criteria that are dependent on the spatial complexity designation of the population. Spatial complexity designations are presented in Table 3-2.

Table 3-2. Organization of goals, mechanisms, factors and metrics for spatial structure and diversity risk rating.

Goal	Mechanism	Factor	Metrics
A. Allowing natural rates and levels of spatially mediated processes.	1. Maintain natural distribution of spawning aggregates.	a. number and spatial arrangement of spawning areas.	Number of MSAs, distribution of MSAs, and quantity of habitat outside MSAs.
		b. Spatial extent or range of population	Proportion of historical range occupied and presence/absence of spawners in MSAs
		c. Increase or decrease gaps or continuities between spawning aggregates.	Change in occupancy of MSAs that affects connectivity within the population.
B. Maintaining natural levels of variation.	1. Maintain natural patterns of phenotypic and genotypic expression.	a. Major life history strategies.	Distribution of major life history expression within a population
		b. Phenotypic variation.	Reduction in variability of traits, shift in mean value of trait, loss of traits.
		c. Genetic variation.	Analysis addressing within and between population genetic variations.
	2. Maintain natural patterns of gene flow.	a. Spawner composition.	(1) Proportion of hatchery origin natural spawners derived from a local (within population) brood stock program using best practices.
			(2) Proportion of hatchery origin natural spawners derived from a within MPG brood stock program, or within population (not best practices) program.
			(3) Proportion of natural spawners that are unnatural out-of MPG strays.
			(4) Proportion of natural spawners that are unnatural out-of ESU strays.
	3. Maintain occupancy in a natural variety of available habitat types.	a. Distribution of population across habitat types.	Change in occupancy across ecoregion types
	4. Maintain integrity of natural systems.	a. Selective change in natural processes or impacts.	Ongoing anthropogenic activities inducing selective mortality or habitat change within or out of population boundary

Integrating the Four VSP Parameters

These abundance/productivity and spatial structure/diversity considerations form the centerpiece of the ICTRT's framework for assessing ESU viability (Cooney et al. 2005). The approach is based on guidelines in McElhany et al. (2000), the results of previous applications (i.e., Puget Sound and Lower Columbia/Willamette TRTs and Upper Columbia Qualitative Analysis Review), and a review of specific information available relative to listed Interior Columbia ESU populations.

The ICTRT integrates all four VSP parameters using a simple matrix approach (Figure 3-3). The abundance/productivity risk level combines the abundance and productivity VSP criteria using a viability curve. The spatial structure/diversity risk level integrates across 12 measures of spatial structure and diversity. The overall diversity viability rating that any population is assigned is determined using two guiding principles. First, the VSP concept (McElhany et al. 2001) provides a 5 percent risk criterion to define a viable population. Therefore, any population scored moderate or high risk in the abundance/productivity criteria would not meet the recommended viable standards. In addition, any population that is high risk in SS/D would not be considered viable. Second, populations with a Very Low rating for A/P and at least a Low rating for SS/D are considered "Highly Viable". Populations with a Low rating for A/P and a Moderate rating for SS/D are considered "Maintained" or minimally viable. This integration approach places greater emphasis on the abundance/productivity criteria. These individual ratings are then integrated to determine the viability of major population groups within an ESU. The assessments of individual MPGs are aggregated to assess the ESU as a whole (ICTRT 2005).

Abundance / Productivity Rating	Spatial Structure / Diversity Rating: Very Low	Low	Moderate	High
Very Low (<1%)	Highly Viable	Highly Viable	Viable	Maintained
Low (<5%)	Viable	Viable	Viable	Maintained
Moderate (<25%)	Maintained	Maintained	Maintained	High Risk
High	High Risk	High Risk	High Risk	High Risk

Figure 3-3. Matrix used to assess population viability across VSP criteria. Percentages for abundance and productivity scores represent the probability of extinction in a 100-year time period (ICTRT 2007b).

3.3 Listing Factors and Threats Criteria

Listing factors are those features that are evaluated under section 4(a)(1) when initial determinations are made whether to list species for protection under the ESA. "Threats," in the context of salmon recovery, are understood as activities or processes that cause the biological and physical conditions that limit salmon survival (the limiting factors). "Threats" also refer directly to the listing factors detailed in section 4(a)(1) of the ESA.

ESA section 4(a)(1) listing factors are the following:

A. Present or threatened destruction, modification, or curtailment of the species habitat or range;
B. Over-utilization for commercial, recreational, scientific, or educational purposes;
C. Disease or predation;
D. Inadequacy of existing regulatory mechanisms; or
E. Other natural or human-made factors affecting the species' continued existence.

NMFS listed the Snake River spring/summer Chinook ESU and steelhead DPS in response to a biological review that concluded that the Snake River spring/summer Chinook ESU and steelhead DPS were "likely to become endangered in the foreseeable future" (NMFS 1999). Prominent features leading NMFS to list the ESU and DPS included: (1) declines in abundance of wild steelhead populations; (2) levels of abundance well below historical levels; (3) continuing disruption due to the impact of mainstem hydroelectric development, including altered flow regimes and impacts on estuarine habitats; (4) risks associated with the use of outside hatchery stocks in particular areas, specifically including major sections of the Grande Ronde River basin; (5) habitat alterations in the region resulting in a loss of spawning and rearing habitat for spring/summer Chinook and steelhead (Busby et al.; Good et al. 2005).

The listing factors (threats) criteria are measures that NMFS will use to reevaluate the status of the Snake River spring/summer Chinook ESU and steelhead DPS. They are based on the features that were evaluated under section 4(a)(1) when the initial listing determinations were made under the ESA. Recovery plans are required to contain these criteria. At the time of a delisting decision, NMFS will use the criteria to determine whether the section 4(a)(1) listing factors (above) have been adequately addressed, i.e. whether the underlying causes of decline have been addressed and mitigated and are not likely to re-emerge. The listing factors (threats) criteria that will be used to reevaluate the status of the Snake River spring/summer Chinook ESU and steelhead DPS are included in NMFS' Snake River Recovery Plan and are not duplicated here.

3.4 Delisting Decision

NMFS reviews species viability and makes ESA listing and delisting decisions at the ESU and DPS level. Because the Idaho Management Unit recovery plan is one of three such units covering the Snake River spring/summer Chinook ESU and steelhead DPS, the major population groups covered in this Plan will be reviewed as part of the status review at the ESU and DPS level. NMFS' Snake River Recovery Plan will describe the biological viability criteria and listing factors (threats) criteria used in the listing review process for these ESU and DPS.